Fabrication of highly-flexible hierarchical polypyrrole/carbon nanotube on eggshell membranes for supercapacitors

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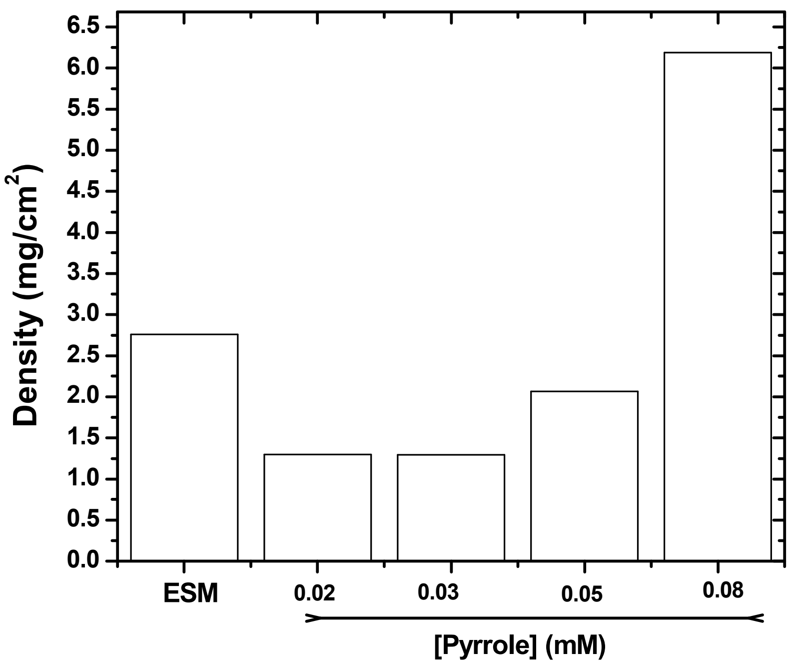

Figure S1 – Mass density of active material deposited on ESM membrane

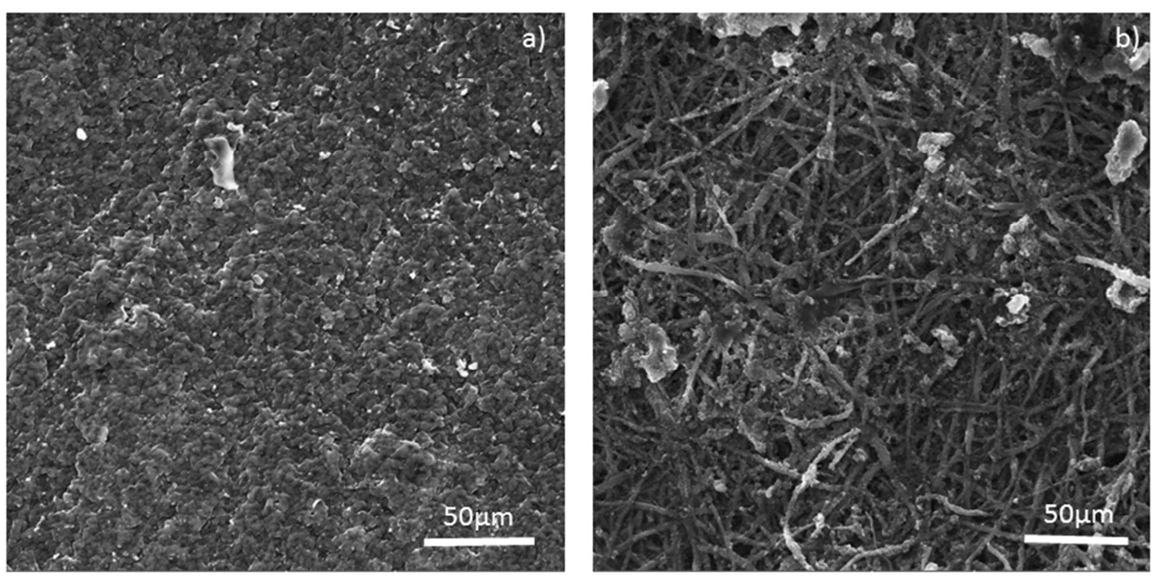

Figure S2 – SEM images of PPy-ESM (a) and PPy-*f*-MWCNT ESM surface (b).

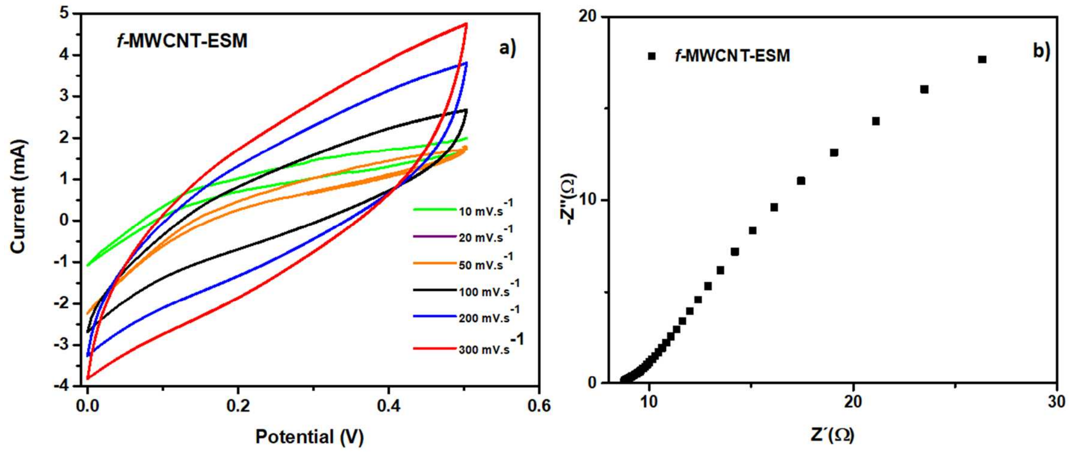

Figure S3 –-C-V (a) and R-X (b) diagram of a flexible *f*-MWCNT ESM supercapacitor.

Supercapacitor calculations

All supercapacitors were prepared with 1 cm^2 electrodes and characterized with a current density of 0.5 $mA.cm^{-2}$.

$$C_{sp}\left(\frac{F}{g}\right) = \frac{4I}{m\left(\frac{dV}{dt}\right)} \qquad , \qquad Eq. S1$$

where ***C_{sp}***, *m*, *V*, *t* and *I* are the specific capacitance for one electrode, the combined mass of two electrodes, the potential window and the time of discharge, respectively.

$$C_A = \frac{2.I.t}{V.A} \qquad , \qquad Eq. S2$$

where C_A and *A* are the areal capacitance and the area of the device*. I, t* and *V* have been previously defined in *Eq. S1*.

$$C_v = \frac{I.t}{V.v} \qquad , \qquad Eq. S3$$

where C_v and V are the volumetric capacitance and the volume of the whole supercapacitor cell. *I, t*, and *V* have been previously defined in *Eq. S1*.